INVERSE FUNCTIONS

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Name: _____

Laws of Exponents. Let $a, b \neq 1$ be positive numbers. If x and y are any real numbers, then

$b^{x+y} = b^x b^y$ $\qquad$ $b^{x-y} = \frac{b^x}{b^y}$ $\qquad$ $(b^x)^y = b^{xy}$ $\qquad$ $(ab)^x = a^x b^x$

Simplify the following expressions.

1. $\dfrac{4^{-3}}{2^{-2}}$

2. $8^{4/3}$

3. $x(3x^2)^3$

4. $b^8(2b^4)$

Laws of Logarithms. Let $a, b \neq 1$ be positive numbers. If x and y are positive numbers, then

$$\log_b(xy) = \log_b(x) + \log_b(y) \qquad \log_b(x^r) = r \log_b(x)$$
$$\log_b\left(\frac{x}{y}\right) = \log_b(x) - \log_b(y) \qquad \log_b(x) = \frac{\log_a(x)}{\log_a(b)}$$

Find the given logarithm.

5. $\log_9(1)$

6. $\log_9(9^8)$

7. $\log_9(9)$

8. $\log_7(1)$

9. $\log_7(49)$

10. $\log_7\left(\frac{1}{49}\right)$

11. $\log_3\left(\frac{1}{27}\right)$

12. $\log_{10}(\sqrt{10})$

13. $\log_5(0.2)$

Expand the given expression.

14. $\log_5\left(\frac{x}{2}\right)$

15. $\log_3\left(x\sqrt{y}\right)$

16. $\log_3(5a)$

17. $\log_5\left(\frac{2a}{b}\right)$

18. $\log_{10}\left((w^2z)^{10}\right)$

19. $\log_7\left(\dfrac{\sqrt[3]{wz}}{x}\right)$

Combine the given expression.

20. $4\log_2(x) - \frac{1}{3}\log_2(x^2+1)$

21. $\log_{10}(5) + 2\log_{10}(x) + 3\log_{10}(x^2+5)$

22. $2\log_8(x+1) + 2\log_8(x-1)$

23. $\log_5(x^2-1) - \log_5(x-1)$